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The Western Rock Lobster Fishery 1982–1983

BY
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AND
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PERTH
WESTERN AUSTRALIA

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Department of Fisheries and Wildlife

108 Adelaide Terrace

PERTH

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THE WESTERN ROCK LOBSTER FISHERY 1982/83

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I INTRODUCTION

The fishery for the western rock lobster *Panulirus cygnus* is one of the most important single fisheries in Australia and an important export earner for the State. Western Australia produced a record 12 416 tons in 1982/83, out of a total Australian rock lobster catch of 18 192 tons. The fishery is governed by a complex set of regulations which have been reviewed by Bowen (1971) and Hancock (1981) and which are designed to limit the total fishing effort to acceptable levels and to enforce a legal minimum size. It is thus important to constantly monitor the state of the fishery both to ensure that the fishing effort is remaining within the accepted limits and that the regulations are adequately performing their function of maintaining reasonably stable catches. Inherent in this monitoring of the fishery is a careful examination of fishing practice, gear, etc. which may lead to increases in efficiency which may not be detectable through the usual calculations of fishing effort.

This paper is the tenth of a series of annual reviews of the previous rock lobster season which will discuss fishing practice, catches, effort, mean size and various other factors, a knowledge of which will help towards a better understanding of the status of the fishery. Each review is in a standardised format to allow season to season comparisons and examination of long term trends.

II METHODS

Catch and effort data were extracted from figures obtained from fishermen's monthly returns and supplied by the Australian Bureau of Statistics and also from rock lobster research log book data*. While mean size information was gathered from measurements made by Departmental Research Staff aboard commercial vessels fishing from Dongara, Jurien, Lancelin and Fremantle. Information on trends in fishing practice was gathered principally from conversations with fishermen at various ports as well as from comments made in research log books.

III RESULTS

A. CATCH AND EFFORT DATA

The fishing season extends from 15 November to 30 June and may be subdivided into three distinct phases, viz (i) the "whites" fishery (George, 1958) which begins suddenly in late November (as pale-coloured newly-moulted rock lobsters leave the shallow reef areas) and arbitrarily finishes

* Twenty-four percent of skippers voluntarily submitted rock lobster research records during the 1982/83 season.

on 31 December; (ii) the "coastal red" fishery which begins on 1 January and ends on 30 June; and (iii) the Abrolhos Islands fishery which is restricted to 15 March to 30 June.

In fishing seasons prior to 1977/78 both the coastal and the Abrolhos Islands fisheries ended on 14 August. The season was shortened by six weeks in 1977/78 as a conservation measure (Hancock, 1981).

In 1982 the "whites" run commenced early in Geraldton on about 15 November, 20 November in Jurien and 19 November in Fremantle.

Catches (kg) and fishing effort (in number of pot lifts) were as follows:

"Whites" catch	(15 Nov-31 Dec)	=	5 133 839 kg
"Whites" effort	(" " ")	=	3 051 906 Pot lifts
"Coastal Reds" catch	(1 Jan-30 June)	=	5 754 443 kg
"Coastal Reds" effort	(" " ")	=	7 363 252 Pot lifts
Abrolhos catch	(15 Mar-30 June)	=	1 527 332 kg
Abrolhos effort	(" " "	=	1 208 387 Pot lifts
Total		=	12 415 604 kg
Total effort		=	11 623 545 Pot lifts

These figures do not include unrecorded sales (i.e. rock lobsters which are sold for cash, etc. and are not recorded in the fishermen's monthly returns of catches and which totalled approximately 469 600 kg), or the total amateur catch which has been estimated at approximately 200 000 kg (Norton, 1981). Figure 1 shows comparative catch, fishing effort (i.e. the number of pot lifts[+]) and catch per fishing effort data from previous years.

Catch and effort data from various statistical blocks (Figure 2) are shown in Table 1 with catches expressed in kg weight and fishing effort as number of pot lifts. Table 2 shows catch per pot lift data for the same statistical blocks. The total fishing effort was 11 623 545 units of fishing effort, 3.3% greater than the 1981/82 season.

B EXPORTS AND GRADE CATEGORIES

Rock lobster tails processed for export are graded by weight and packed in 11.34 kg cartons. The various grades, together with the percentage of cases packed in each grade for the period November 1982 to June 1983 were as follows:

Section B is based on data provided by selected processing establishments from Fremantle to Geraldton.

[+] Fishing effort is measured as the number of pot lifts (pulls) recorded by fishermen in their Australian Bureau of Statistics monthly returns. In the annual reports prior to 1977/78 fishing effort was calculated as effective fishing effort by the method of Gulland (1969).

Grade	% of Cases
A (140 - 179 grams)	41.5
B (180 - 239 grams)	36.3
C (240 - 279 grams)	10.0
D (280 - 359 grams)	6.1
E (360 - 479 grams)	3.5
F (480 - 599 grams)	1.8
G (600 - grams)	0.9

C. MEAN SIZE

Samples of rock lobsters from four depth categories at various ports were measured aboard commercial vessels using pots with 54 mm escape gaps. The sample would hence include all commercial size rock lobsters, plus undersize which would have been reduced in number by selection by the escape gap (Bowen, 1963). Mean carapace lengths of males and females from various depth categories at Fremantle, Lancelin, Dongara and Jurien, taken throughout the fishing season have been compared in Table 3. The omissions in the table are due to either fishermen not fishing the area in question or to some circumstance (breakdown, etc.) which prevented the data from being collected.

D. NUMBER OF BOATS

The number of boats licensed in Zones A, B, C, D and E to fish for rock lobsters is carefully controlled, though boat owners are able to nominate their choice of fishing area, viz. north or south of 30°S. As at 24 November 1983, the number of boats licensed to fish in the various zones was as follows:

Number of boats licensed in 1982/83	=	774
Number of boats licensed in Zone A	=	201
Number of boats licensed in Zone B	=	175
Number of boats licensed in Zone C	=	382
Number of boats licensed in zone D	=	7
Number of boats licensed in Zone E	=	9

E. FORECAST OF 1982/83 RECRUITMENT

As a result of very high levels of puerulus settlement in earlier years, recruitment during 1982/83 was very high, resulting in a record commercial catch. Figure 4 which has been incorporated in the annual report for the first time shows rock lobster catch and index of annual puerulus settlement.

F. INTRODUCTION OF NEW LEGISLATION

As from 9 July 1982, Limited Entry License fees for the W.A. Rock Lobster Fishery were amended as follows:

	Approved New Fee
Zones A, B, C and D	$5.00 per pot
Zone E	$3.50 per pot.

Information regarding these changes to the legislation governing the rock lobster fishery, as well as the Department of Fisheries and Wildlife's policies on various issues, may be found in the following volume of the Fishing Industry New Service (F.I.N.S.):

Vol. 15 No. 3 (Nov 1982) p 25.

G. EFFECTS OF NEW LEGISLATION

The changes in the legislation were of an administrative nature and hence had little direct effect on levels of catch and fishing effort.

H. INNOVATIONS TO BOATS AND GEAR

Data supplied by the Marine and Harbours Department showed that a total of 34 boats were replaced during the period 1 July 1982 to 30 June 1983. In the northern area a total of 22 boats were replaced, these ranged in size from 7.50 metres to 14.60 metres and averaged 12.00 metres in length, whilst in the southern area a total of 12 boats were replaced ranging in size from 9.70 metres to 18.00 metres and averaging 14.40 metres in length. As in the previous season the trend in the northern area was towards small to medium sized vessels whilst in the southern area the trend was towards medium to large sized vessels. During this period there was a reduction of 23.0% on the number of boats replaced during the 1981/82 season. The boat replacements were constructed as follows:

	WOOD	FIBREGLASS	ALUMINIUM
North 30°S	-	8	14
South 30°S	3	4	5
	3	12	19

Information supplied by the largest manufacturer and supplier of commercial boats to the rock lobster industry showed that the price of an average sized vessel (13.9 metres to 14.5 metres in length in the southern sector of the fishery) constructed of either aluminium or fibreglass and ready for launching, ranged from approximately $118 000 to approximately $122 000. The price of new vessels varies, depending on the amount of equipment installed, viz. colour echo sounder, radar, automatic pilot, satellite navigation, etc.

The price of distillate (boat fuel) varied throughout the season, however the approximate average price per litre paid by fishermen both north and south of 30°S during the 1982/83 season was as follows. Prices quoted are from selected fuel outlets and processing establishments. During the season fishermen were entitled to claim a diesel fuel rebate of 6.155 cents per litre.

NORTH 30°S	SOUTH 30°S
38.63 cents	39.40 cents

Data from Research Log Books showed the following usage of various types of pots by fishermen north and south of 30°S:

	STICK AND CANE BEEHIVE	BATTEN	STEEL BEEHIVE
North	15%	83%	2%
South	50%	46%	4%

The trend throughout the fishery toward the use of large batten pots, many with built-in bait containers and plastic necks, continued. Smaller numbers of larger than usual ti-tree and cane beehive pots also continued to be used.

As in the previous season the Geraldton designed and made mechanical rope coiler was fitted to many existing and new rock lobster boats.

The price paid by fishermen in the southern sector of the fishery for a "standard" batten pot (915 mm [length] x 800 mm [width] x 540 mm [top width] x 420 mm [height]) equipped with one zinc anode, 2 built-in bait baskets with lids, plastic neck and ballast was $61.00, whilst the price paid for a "standard" ti-tree and cane beehive pot with skid board was $32.00.

In the northern sector the price paid by fishermen for a similar batten pot was $58.00. Ti-tree and cane beehive pots are not manufactured for sale in the northern sector, however, some fishermen do manufacture beehive pots for their own personal use. Some beehive pots are also imported from Fremantle.

The price paid by fishermen for a popular brand of imported 10 mm polyethylene mono pot rope was 31 cents a metre or $68.20 for a 220 metre coil. Eight inch polystyrene pot line floats sold for $2.14 each.

I. BAIT

Data from Research Log Books showed the following usage of bullock hocks and pieces of cattle hide as holding bait in both northern and southern areas:

	HOCKS	HIDES
North 30°S	34%	66%
South 30°S	35%	65%

North of 30°S the most popular fish baits used in combination with bullock hocks or pieces of cattle hide were Australian and New Zealand salmon heads and pieces of salmon meat (*Arripis trutta esper*, *Arripis trutta marginata* and *Arripis trutta trutta*), Australian herring or ruff (*Arripis georgianus*), yellow-eye mullet (*Aldrichetta forsteri*), scaly mackerel (*Sardinella lemuna*), bony herring (*Nematalosa vlaminghi*) and bonito (*Sarda sp.*). South of 30°S, the following fish baits (in order of preference) also used in conjunction with bullock hocks or pieces of cattle hide, were, Australian and New Zealand salmon heads and pieces of salmon meat, pilchards (*Sardinops neopilchardus*), yellow-eye mullet, scaly mackerel, imported mackerel and mackerel heads (*Scomber sp.*), bonito and local tuna heads (*Thunnus sp.*). A wide range of fish baits both local and imported were available and were used in addition to the above baits throughout the 1982/83 season.

The price paid by fishermen both north and south of 30°S for the more popular lines of bait during the 1982/83 season were as follows. Prices quoted are from selected processing establishments.

	NORTH 30°S	SOUTH 30°S
Hocks per bag of 24	$10.00	$9.00
Hides per 30 kg bag	$ 9.00	$9.00
Australian salmon heads per kg	$ 1.03	$0.98
New Zealand salmon heads per kg	$ 1.03	$0.98
Australian herring per kg	$ 1 03	
Yellow-eye mullet per kg	$ 0.93	$0.85
Scaly mackerel per kg	$ 0.72	$0.78
Bonito per kg	$ 0.60	$0.62
Bony herring per kg	$ 0.96	-
Imported mackerel and mackerel heads per kg	-	$0.72 to $0.78
Tuna heads per kg	-	$0.62

J. DISTRIBUTION OF FISHING

The distribution of fishing is shown in Table 1. The pattern of fishing does not vary greatly from season to season and is dependent on the density of rock lobsters in the various depth categories. Throughout the season the usual pattern of fishing occurred, i.e. concentrated in the shallows during November and December, followed by deep water potting during the latter part of December,

January and February, back to the shallows during the latter part of February, March and April and in mixed depths (mainly shallower), depending on weather and density of rock lobsters, throughout the remainder of the season.

During the early part of 1983 a number of vessels fished for rock lobsters from South Passage in Shark Bay. The number of vessels that fished from this anchorage was less than the previous season as were the catches taken by those boats.

As in the previous season, vessels again fished for western rock lobsters from Augusta and Windy Harbour. The catches taken by these boats were outside the W.A. Rock Lobster limited entry fishery concession area.

K. AVERAGE NUMBER OF DAYS WORKED PER BOAT PER MONTH

NORTH 30°S

Month	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Days Worked	15.2	24.8	15.9	21.7	21.9	25.6	23.1	16.8

SOUTH 30°S

Month	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Days worked	14.7	24.3	20.9	23.2	24.9	19.1	17.3	14.3

TOTAL

Month	Nov.	Dec.	Jan	Feb.	Mar.	Apr.	May	June
Days worked	14.9	24.6	18.6	22.5	23.4	22.3	20.2	15.6

North of 30°S the average number of days worked per boat during November and December was 4.1% up on the 1981/82 season and for the period January to June was 2.9% up on the 1981/82 season, whilst south of 30°S the average number of days worked per boat during November and December was 6.5% up and for the period January to June was 1.0% down on the previous season. For both the northern and southern areas combined, the average number of days worked for November and December was 5.9% up and for the period January to June was 1.0% up on the previous season.

The average number of days worked per boat per month for the 1982/83 season was 20.4, which was an increase of 1.5% on the 1981/82 season.

L. PRICE OF ROCK LOBSTERS

Price to fishermen:

At the commencement of the season the price paid to

fishermen per kg was $7.00 for processing and $7.50 for live export. During December the price dropped to $6.50 and $7.00 and remained at that price until the last month of the season when the price rose to $7.00 and $7.50. The average cash or beach price for the season was $6.70 and the pool price approximately $8.00.

Average wholesale New York price for tails.

GRADE	$US. PER KG
5 - 6 oz (113 - 170 grams)	22.66
6 - 8 oz (170 - 226 grams)	20.43
8 - 10 oz (226 - 283 grams)	21.36
10 - 12 oz (283 - 340 grams)	21.77
12 - 16 oz (340 - 453 grams)	NA
16 - 20 oz (453 - 566 grams)	NA
over 20 oz (over 566 grams)	NA

M. MARKET TRENDS AND ECONOMIC FACTORS

The prices for rock lobster tails on the United States market for most grades declined over 1982 and remained static during the first six months of 1983. Wholesale prices in June 1983 were around 10.0% lower than those in June 1982, due to the combined effect of difficult economic conditions, consumer resistance to high prices and increased total supplies.

The Australian dollar, devalued in March 1983 by 10.0% against th US dollar, was 14.0% weaker than the previous year's value. This devaluation allowed for higher returns for export commodities, th assisting the Australian rock lobster export trade.

N. AVERAGE VALUE PER POT ON POT REDISTRIBUTION

During the season the price increased from about $1 614 to $2 250.

O. SEA WATER TEMPERATURES AND SALINITIES

These have relevance to the behaviour and catch rates of rock lobsters (Morgan, 1974). The average sea water temperature during the rock lobster season (i.e. 15 November to 30 June) at Waterman (aquarium header tank) was 21.0°C, with a maximum of 23.1°C on week ending 25 December 1982 and a minimum of 17.2°C on week ending 2 July 1983. The average salinity during the seas at Waterman (aquarium) was 35.655% with a maximum of 36.314% on Febuary 1983 and a minimum of 34.928% on week ending 13 November 1982.

Bottom temperatures and surface salinities in waters of various depths in the Fremantle, Lancelin, Jurien and Dongara areas were collected as part of the monitoring of rock lobster catches (Item B) and are shown in Table 4. Other records are maintained by CSIRO.

P. SPAWNING ROCK LOBSTERS

While most of the breeding females are found in the 20 - 30 fathom range, no variation has been observed in the size at first breeding from one depth category to another, except at Jurien over 30 fathoms (Chittleborough, pers. comm.). Hence the data for December, January and February from all depths with the exception of Jurien over 30 fathoms may be pooled to indicate the size frequency of breeding (i.e. "berried" and mated) females and this has been done in Figure 3. The mean size of breeding females was greater at Fremantle and Lancelin than at either Jurien or Dongara with the mean sizes being 90.1 mm for Dongara, 94.4 mm for Jurien, 100.1 mm for Lancelin and 104.7 mm for Fremantle. By comparison the mean sizes at first breeding (i.e. the smallest carapace length at which 50% have been mated) were found to be 98.5 mm at Fremantle, 97.7 mm at Lancelin, 93.8 mm at Jurien and 86.3 mm at Dongara.

IV DISCUSSION

Very high puerulus settlement in earlier years resulted in very high recruitment to the commercial fishery and the highest catch in the history of the fishery of 12, 415, 604 kg. This increase in catch of 17.7% on the previous season was a direct result of high recruitment to the fishery rather than an increase in fishing effort (number of pot lifts), as the total number of pot lifts only increased by 3.3% and the average number of days worked per boat per month only increased by 1.5% on the previous season.

Although catches were high the price that fishermen received for their catch was similar to the 1981/82 season. However, devaluation of the Australian dollar in March 1983 did allow for greater returns on exports thereby assisting the rock lobster industry.

New boat replacements which were 23.0% down on the previous season reflected the economic quiet felt within the industry. Fuel prices rose steeply and with the exception of two popular lines of rock lobster bait the wholesale price of bait remained stable.

V ACKNOWLEDGEMENTS

Measurements aboard fishing vessels were performed by Mr M. Rossbach and Mr G. Davis. The information on Market Trends and Economic Factors was provided by Mr P. Rogers of the Department of Fisheries and Wildlife.

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TABLE 1: CATCH (IN KG WEIGHT) AND FISHING EFFORT (IN POT LIFTS) FOR THE 1982/83 ROCK LOBSTER SEASON IN VARIOUS STATISTICAL BLOCKS.

BLOCK	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
2412	-	-	-	-	-	-	-	-	-
2413	-	-	-	-	-	-	-	-	-
2512	-	-	3850 (2465)	5315 (6029)	5903 (2465)	7804 (7050)	2109 (2375)	7143 (6485)	32124 (26869)
2612	-	-	13096 (14744)	10836 (11970)	5190 (3200)	3182 (1800)	9690 (7821)	2053 (2745)	44047 (42280)
2613	-	1950 (1521)	6192 (8152)	9982 (12216)	3260 (4732)	2730 (3300)	6524 (8623)	-	30638 (38544)
2712	-	-	1527 (3020)	-	-	-	-	-	1527 (3020)
2713	20968 (13026)	51237 (38571)	57890 (55527)	30920 (48910)	61487 (45058)	52806 (47238)	32384 (34472)	12788 (19187)	320480 (301989)
2714	12097 (9390)	27896 (23350)	12671 (20494)	11767 (18368)	25401 (23424)	16447 (14406)	15681 (16652)	7933 (9312)	129893 (135396)
2812	-	-	-	-	5579 (2295)	2500 (2160)	5742 (4860)	649 (1350)	14470 (10665)
2813	9739 (4050)	14829 (12175)	1045 (5625)	980 (2050)	617760 (271287)	565987 (445584)	280262 (351921)	63323 (139595)	1553925 (1232287)
2814	287388 (156271)	375685 (248313)	55649 (130459)	129002 (212032)	111047 (98011)	81918 (96435)	70095 (106447)	59299 (84859)	1170083 (1132827)
2912	-	-	-	-	-	-	-	-	-
2913	-	5866 (2232)	827 (6702)	244 (1600)	19084 (10631)	32617 (20061)	5041 (6634)	- -	63679 (47860)
2914	494965 (329538)	889539 (537564)	126210 (242724)	265701 (353083)	310860 (304671)	260162 (248069)	162573 (215556)	112839 (161952)	2622849 (2393157)
3012	-	-	-	-	-	-	-	-	-
3013	-	-	-	-	-	-	-	-	-
3014	233732 (193722)	686625 (335117)	128187 (220667)	144717 (236708)	260265 (279312)	203430 (226732)	92883 (167630)	70946 (121392)	1820785 (1781280)
3015	91926 (56037)	173817 (74908)	40186 (57657)	45508 (58220)	61778 (66422)	37652 (53305)	14137 (28728)	10745 (20017)	475749 (415294)
3112	-	-	-	-	-	-	-	-	-
3113	-	-	-	-	-	-	-	-	-
3114	17005 (15347)	88904 (48855)	36812 (52379)	30996 (43823)	48074 (50655)	17816 (24110)	1623 (3014)	1149 (1754)	242379 (239937)
3115	366615 (249578)	798693 (411985)	304734 (351840)	380287 (437140)	383064 (442152)	229860 (328254)	147581 (279729)	81245 (167166)	2692079 (2667844)
3212	-	-	-	-	-	-	-	-	-
3213	-	-	-	-	-	-	-	-	-
3214	5876 (4582)	24947 (11592)	12297 (12289)	9809 (7794)	2245 (2323)	1300 (3245)	2433 (3726)	1932 (2469)	60839 (48020)
3215	114371 (84845)	321372 (167384)	130816 (136805)	130318 (153336)	123248 (149375)	69453 (107202)	72065 (94070)	39718 (60449)	1001361 (953466)
3314	-	-	6584 (6270)	6816 (6225)	7192 (6406)	2164 (2865)	-	-	22756 (21766)
3315	5044 (6518)	10096 (6980)	2819 (2703)	7936 (6981)	10015 (8832)	9299 (10637)	14775 (13408)	13315 (11244)	73299 (67303)
3414	237 (1782)	1442 (3160)	4612 (6472)	5526 (5796)	6884 (7172)	6468 (7332)	3586 (5428)	2909 (3508)	31664 (40650)
3415	243 (1288)	735 (2225)	2296 (2769)	821 (1170)	3064 (5366)	1405 (3825)	656 (2200)	146 (448)	9366 (19291)
3416	-	-	-	307 (1120)	405 (1240)	-	-	-	712 (2360)
3515	-	-	-	900 (1440)	-	-	-	-	900 (1440)
TOTAL	1660206 (1125974)	3473633 (1925932)	948300 (1339763)	1228688 (1626011)	2071805 (1785029)	1605000 (1653610)	939840 (1353294)	488132 (813932)	12415604 (11623545)

TOTAL CATCH = 12,415,604 KG
TOTAL EFFORT = 11,623,545 POT LIFTS

EFFORT FIGURES ARE SHOWN IN PARENTHESIS AND CATCH FIGURES ARE UNDERLINED. NOT INCLUDED IN THESE CATCH FIGURES ARE 7,117 KG OF ROCK LOBSTERS TAKEN BY DIVING.

THESE FIGURES ARE DERIVED FROM DATA KINDLY PROVIDED BY THE AUSTRALIAN BUREAU OF STATISTICS AND REFLECT SLIGHTLY MORE INTENSIVE EDITING BY THE DATA PROCESSING SECTION OF THE FISHERIES DEPARTMENT.

TABLE 2: CATCH (KG) PER UNIT OF FISHING EFFORT (I.E. KILOGRAM OF ROCK LOBSTERS PER POT LIFT) DATA FOR 1982/83 SEASON IN VARIOUS STATISTICAL BLOCKS (SEE FIGURE 2).

BLOCK	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
2412	-*	-	-	-	-	-	-	-	-
2413	-	-	-	-	-	-	-	-	-
2512	-	-	1.56	0.88	2.39	1.11	0.89	1.10	1.20
2612	-	-	0.89	0.91	1.62	1.77	1.24	0.75	1.04
2613	-	1.28	0.76	0.82	0.69	0.83	0.76	-	0.79
2712	-	-	0.51	-	-	-	-	-	0.51
2713	1.61	1.33	1.04	0.63	1.36	1.12	0.94	0.67	1.06
2714	1.29	1.19	0.62	0.64	1.08	1.14	0.94	0.85	0.96
2812	-	-	-	-	2.43	1.16	1.18	0.48	1.36
2813	2.40	1.22	0.19	0.48	2.28	1.27	0.80	0.45	1.26
2814	1.83	1.51	0.43	0.61	1.13	0.85	0.66	0.70	1.03
2912	-	-	-	-	-	-	-	-	-
2913	-	2.63	0.12	0.15	1.80	1.63	0.76	-	1.33
2914	1.50	1.65	0.52	0.75	1.02	1.05	0.75	0.70	2.00
3012	-	-	-	-	-	-	-	-	-
3013	-	-	-	-	-	-	-	-	-
3014	1.21	2.05	0.58	0.61	0.93	0.90	0.55	0.58	1.02
3015	1.64	2.32	0.70	0.78	0.93	0.71	0.49	0.54	1.15
3112	-	-	-	-	-	-	-	-	-
3113	-	-	-	-	-	-	-	-	-
3114	1.11	1.82	0.70	0.71	0.95	0.74	0.54	0.66	1.01
3115	1.47	1.94	0.87	0.87	0.87	0.70	0.53	0.49	1.01
3212	-	-	-	-	-	-	-	-	-
3213	-	-	-	-	-	-	-	-	-
3214	1.28	2.15	1.00	1.26	0.97	0.40	0.65	0.78	1.27
3215	1.35	1.92	0.96	0.85	0.83	0.65	0.77	0.66	1.05
3314	-	-	1.05	1.09	1.12	0.76	-	-	1.05
3315	0.77	1.45	1.04	1.14	1.13	0.87	1.10	1.18	1.09
3414	0.13	0.46	0.71	0.95	0.96	0.88	0.66	0.83	0.78
3415	0.19	0.33	0.83	0.70	0.57	0.37	0.30	0.33	0.49
3416	-	-	-	0.27	0.33	-	-	-	0.30
3515	-	-	-	0.63	-	-	-	-	0.63
TOTAL	1.47	1.80	0.71	0.76	1.16	0.97	0.69	0.60	1.07

* -= NO RECORD OF FISHING

TOTAL CATCH = 12 415 604 KG
TOTAL EFFORT = 11 623 545 POT LIFTS

TABLE 3: MEAN CARAPACE LENGTHS (MM) OF MALE AND FEMALE ROCK LOBSTERS IN VARIOUS DEPTH CATEGORIES AT FREMANTLE, LANCELIN, JURIEN AND DONGARA THROUGHOUT THE FISHING SEASON.

YEAR	AREA	MONTH	0-10 fms		10-20 fms		20-30 fms		30+ fms	
			MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
1982/83	FREMANTLE	NOV	73	70						
		DEC	75	73	79	76	90	84	96	87
		JAN	73	71	106	98			95	87
		FEB	75	72	80	77	108	98		
		MAR	75	73			92	86	104	97
		APR	75	74	104	89	108	90		
		MAY	80	76	93	83	109	88		
		JUN	79	76			122	104		
1982/83	LANCELIN	NOV	76	74						
		DEC	74	73	81	76	80	76	89	82
		JAN	74	72	78	74	89	92		
		FEB	74	74	86	81				
		MAR	72	71	89	86	89	85	90	87
		APR	74	73	79	76	91	90	92	90
		MAY	74	72						
		JUN								
1982/83	JURIEN	NOV	74	72	77	75				
		DEC	73	71			81	75	77	74
		JAN	72	70			76	74	76	74
		FEB	73	72	81	78	79	77	83	85
		MAR	77	73			82	80	85	80
		APR	71	72	76	73	83	80	83	78
		MAY	72	71						
		JUN	75	72	78	75				
1982/83	DONGARA	NOV	74	71	77	75				
		DEC	74	73			82	77	84	79
		JAN	71	70	74	73	80	85	96	85
		FEB	76	74	77	76				
		MAR	74	73	76	75	84	80	85	83
		APR	76	74	75	73			95	84
		MAY	74	73	75	74	92	82		
		JUN	74	72						

TABLE 4: BOTTOM TEMPERATURE (^{o}C) AND SURFACE SALINITY IN PARTS PER THOUSAND FOR FREMANTLE, LANCELIN, JURIEN AND DONGARA OF WATERS BETWEEN VARIOUS DEPTH CONTOURS FOR THE 1982/83 SEASON

AREA	DEPTH FATH.	NOV		DEC		JAN		FEB		MAR		APR		MAY		JUN	
		TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL
FREMANTLE	0-10	-	35.90	21.4	-			22.7	36.10	22.4	36.53	22.4	36.08	19.5	36.03	18.6	35.70
	10-20			20.8	35.70			22.2	36.12			20.8	36.26	21.6	36.21		
	20-30			20.7	35.84							22.4	36.05				
	30+			21.7	35.48												
LANCELIN	0-10	20.8	35.87	20.6	35.95	22.8	36.02	23.0	36.02	23.0	36.62	21.3	36.28	20.3	35.91		
	10-20					22.1	35.77	22.5	35.66	22.9	36.14	21.7	36.14				
	20-30			20.6	35.72					22.3	36.00	22.9	36.05				
	30+			20.6	35.72					21.9	36.10	23.2	35.94				
JURIEN	0-10	21.2	35.92	23.4	35.74	23.2	36.14	23.4	35.94	22.8	36.17	23.6	36.41	21.6	35.84	-	35.62
	10-20	20.4	35.92									22.8	36.08			21.3	35.70
	20-30			20.2	35.72	21.8	-	22.6	36.02	21.8	36.00	23.5	35.82				
	30+			-	35.73	21.9	35.61			23.3	35.86						
DONGARA	0-10	21.9	36.13	21.9	35.87	23.2	35.79	22.8	35.73	24.6	36.56	22.1	36.33	22.2	35.81		
	10-20	21.8	35.95					22.5	35.67	24.1	36.13	23.1	36.47	22.2	35.86	20.1	35.89
	20-30			21.4	35.68	21.7	35.61			22.6	35.94			22.8	35.63		
	30+			21.4	35.65												

TEMPERATURES WERE TAKEN USING A PROTECTED REVERSING THERMOMETER AND SURFACE WATER SAMPLES WERE TAKEN AND LATER ANALYSED TO DETERMINE SALINITY.

TABLE 5: 1982/83 SEX RATIO BY MONTH AND DEPTH CATEGORY, FIGURES ARE % OF FEMALES IN THE TOTAL SAMPLED CATCH.

AREA	DEPTH RANGE FATH.	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
DONGARA	0-10	51	54	49	56	66	54	57	56
	10-20	58		42	55	61	62	59	
	20-30		68	85		68		77	
	30+		61	66		71	67		
JURIEN	0-10	62	51	58	58	54	57	55	54
	10-20	63			56		59		60
	20-30		62	63	49	69	71		
	30+		72	78	74	69	73		
LANCELIN	0-10	64	56	51	65	65	66	58	
	10-20		61	56	59	69	61		
	20-30		61	72		60	64		
	30+		70			74	83		
FREMANTLE	0-10	58	55	56	52	61	49	52	53
	10-20		57	56	56		55	49	
	20-30		52		59	50	47	45	59
	30+		56	67		77			

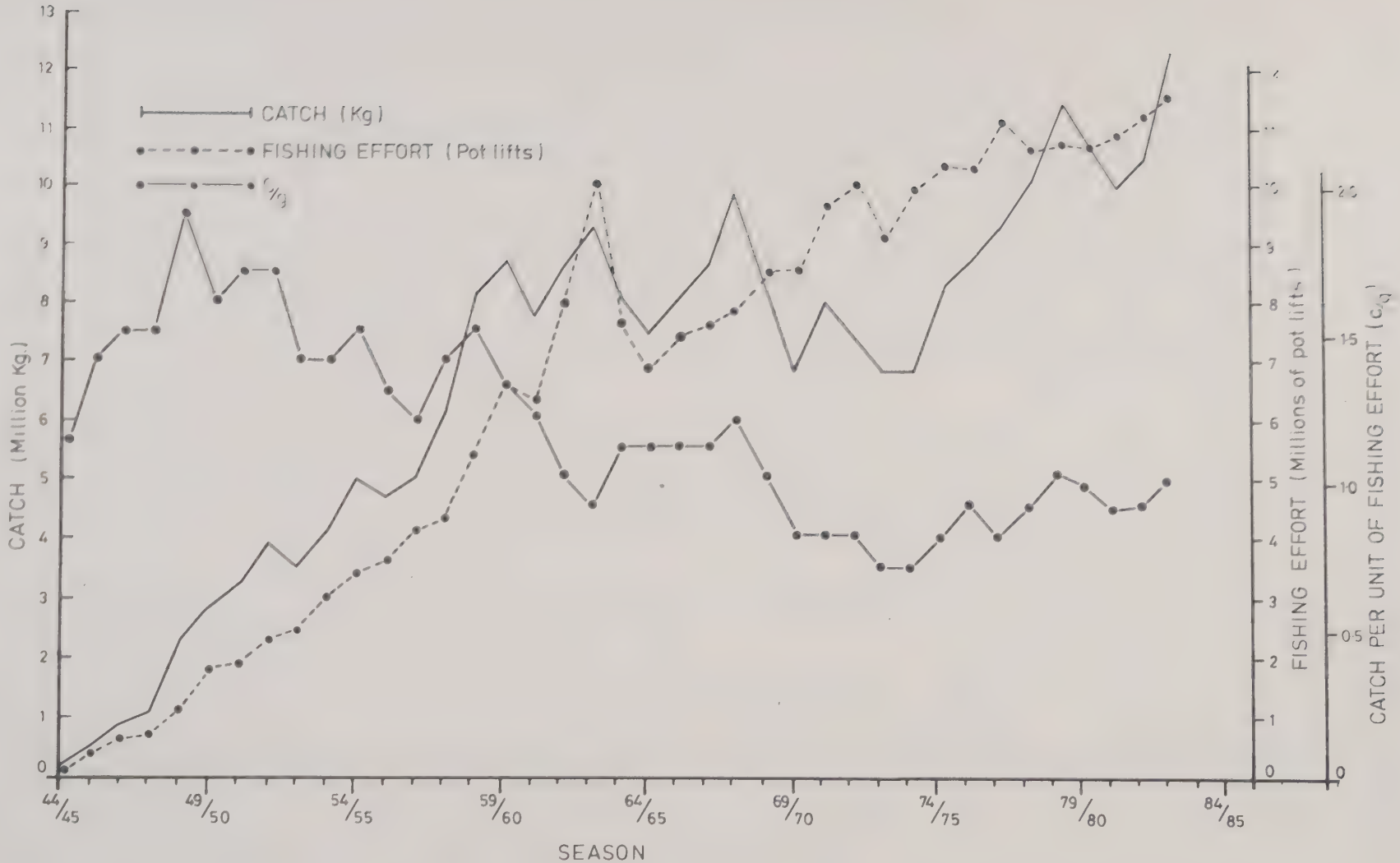

Figure 1. Rock Lobster Catch (kg), Fishing Effort (pot lifts)* and Catch per Unit of Fishing Effort (c/g) Data.

* Prior to the 1977/78 season, fishing effort was calculated as effective fishing effort by the method of Gulland (1969). The complete set of fishing effort data shown here (1944/45 to 1982/83) is obtained as described in the footnote on page 2.

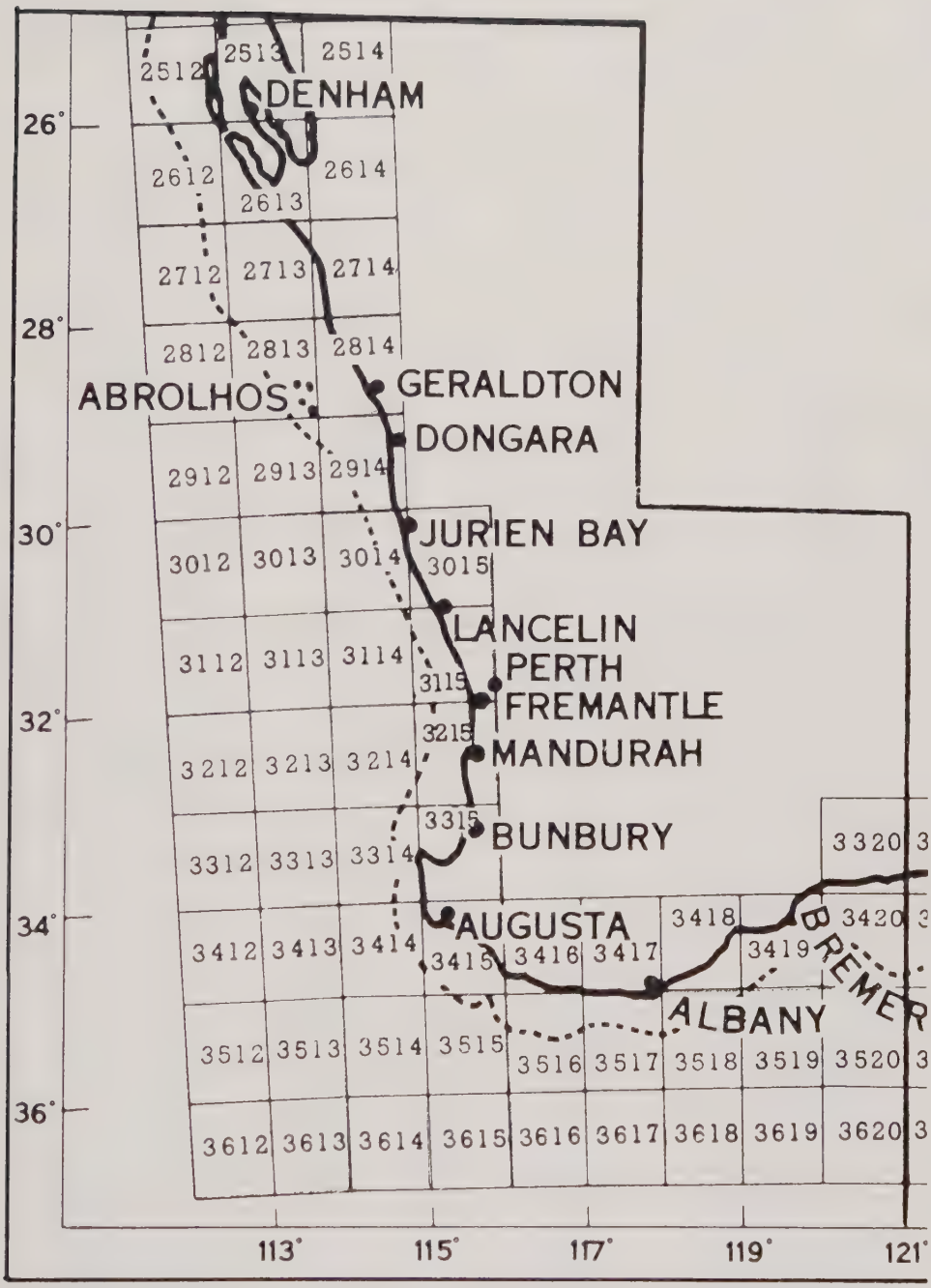

FIGURE 2. Rock Lobster Fishing Areas

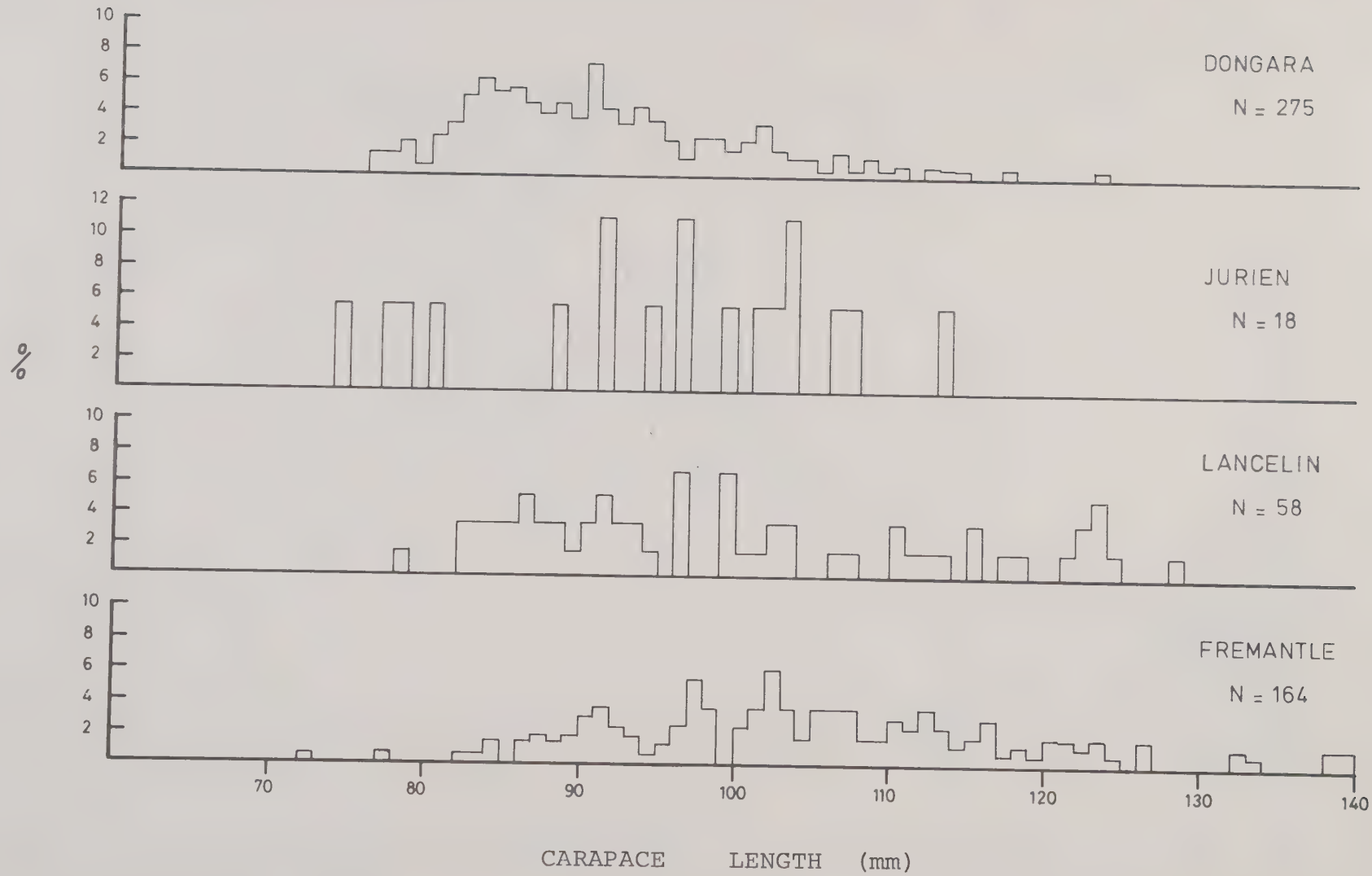

Figure 3. Length frequency of breeding female rock lobsters taken from December 1982 to February 1983.

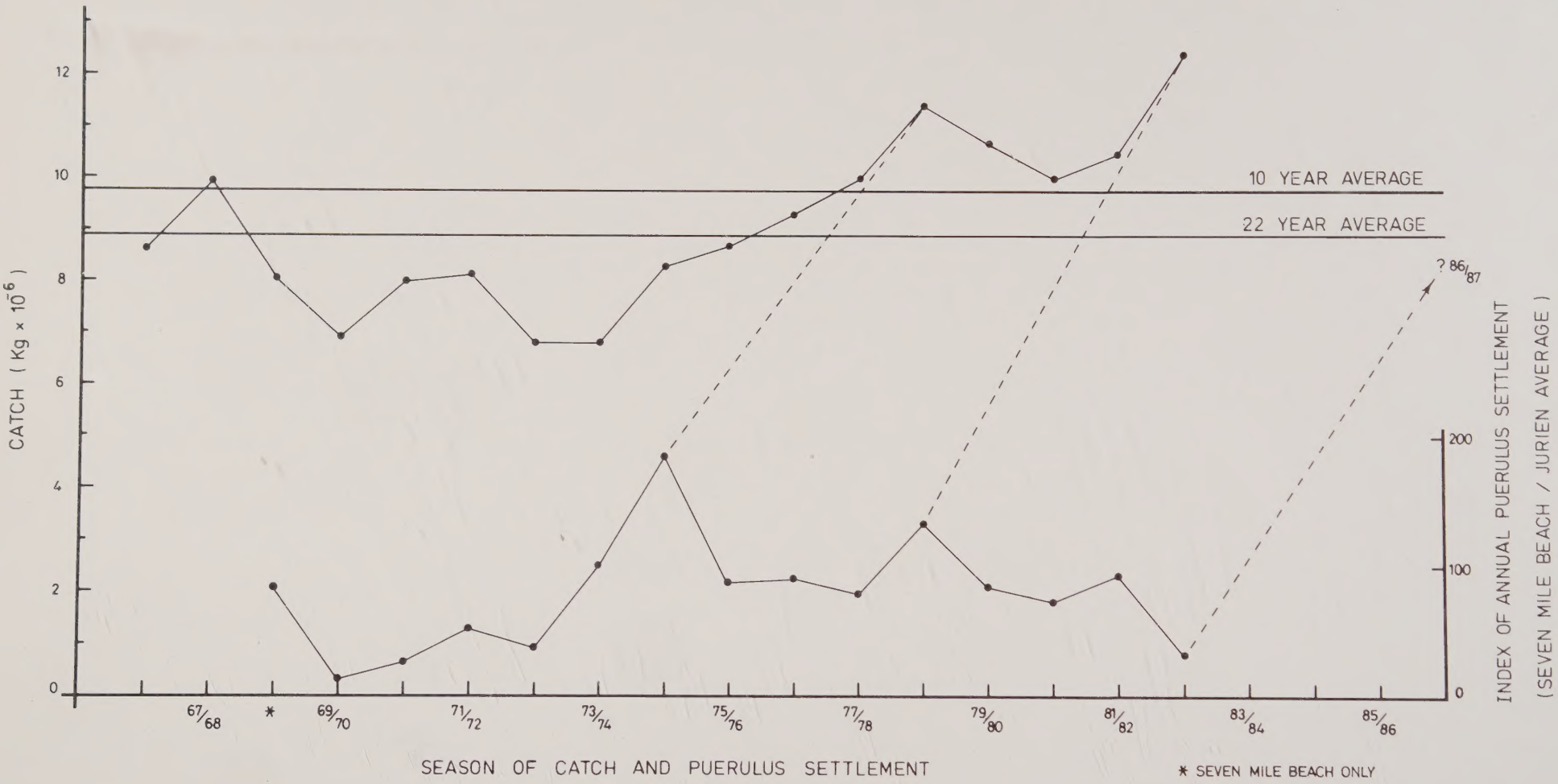

Figure 4. Rock Lobster Catch and Index of Annual Puerulus Settlement. (It takes approximately four years for the puerulus to grow to legal size.)

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